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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/590,351 | 06/20/2007 | Gerard Hillion | PET-2271 | 8163 |
| 7590 | 03/24/2010 | | EXAMINER | |
| Millen White Zelano & Branigan Suite 1400 2200 Clarendon Boulevard Arlington, VA 22201 | | | PO, MING CHEUNG | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1797 | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/590,351 | HILLION ET AL. | |
| | Examiner | Art Unit | |
| | MING CHEUNG PO | 1797 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 11 December 2009.
 2a) This action is **FINAL**. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-20 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-20 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

| | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ . | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION

Response to Amendment

1. This is the response to amendment filed 12/11/2009 for application 10/590351.
2. Claims 1-18 are pending and have been fully considered. Claims 19-20 have been added.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 1 and 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. Claim 1 recites the limitation "without prior chemical or purification with". Appropriate correction is required.
6. Claim 12 recites the limitation "glycerol acetal" produced from an etherification. Acetals are not formed from etherification. Appropriate correction is needed. Claim 12 recites the limitation "(i.e. without prior chemical treatment)". It is unclear what this the scope is.
7. Claims 1 recite the limitations that teach that the glycerol from the transesterification step is reacted directly without prior chemical treatment or purification. However, the glycerol is vacuum treated to remove at least one primary monoalcohol, which is a purification step. It is unclear what applicants are defining as chemical treatment or purification.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1-3, 6-8, and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over BRADIN (U.S 5,578,090) in view of English translation of HILLION (FR 2,794,768).

Regarding claims 1-6 and 12, BRADIN teaches an alternate fuel composition that includes a fuel additive composition. The fuel additive composition is prepared by esterifying the free fatty acids and etherifying glycerol with one or more olefins in the presence of an acid catalyst. BRADIN teaches in lines 34-41 of column 3 that the fatty acid alkyl esters and the glyceryl ethers can be prepared by any means known to those of skill in the art. Means for preparing fatty acid alkyl esters include **transesterifying** triglycerides with **alcohols** in the presence of an **acid or base catalyst**. The alcohol is taught in lines 16-20 of column 4 to be any **C₁₋₆ straight, branched, or cyclic alcohol, but preferably ethanol**. The glyceryl ethers are prepared by reacting glycerol with an alkyl halide in the presence of a base of an olefin or an alcohol in the presence of an acid catalyst. The olefin is taught in lines 62-67 of column 4 and lines 1-6 of column 5 to be preferably an unsaturated straight, branched, or cyclic hydrocarbon of C₂ to C₁₀.

BRADIN does not seem to explicitly teach a heterogeneous catalyst.

However, HILLION teaches in the first paragraph of the description a process for

the manufacture of a fatty acid ester by the use of a **heterogeneous catalyst chosen from zinc oxide, a mixture of zinc oxide and alumina or a zinc aluminate consistent with the formula: $ZnAl_2O_4$, $xZnO$, $y AL_2O_3$ ($x, y= 0-2$), with a 1-18C mono-alcohol.**

It would be obvious to one of ordinary skill in the art to use the catalyst that HILLION as the transesterification catalyst in the process that BRADIN teaches.

The motivation to do so would be for the manufacture of a fatty acid ester to a high state of purity.

Regarding claims 7 and 8, BRADIN teaches in lines 17-21 of column 6 that the esterification reactions can be run in both **batch-type** and continuous reactors.

Regarding claim 11, BRADIN teaches in lines 62-67 of column 4 that **isobutylene (isobutene)** may be used as the olefin in the etherification reaction.

Regarding claims 13 and 14, BRADIN teaches in lines 25-32 of column 5 that the esters may be used in biodiesel fuel.

10. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over BRADIN (U.S 5,578,090) in view of English translation of HILLION (FR 2794768) and further in view of BOURNAY (U.S. 6,878,837).

The above discussion of BRADIN in view of HILLION is incorporated herein by reference.

Modified BRADIN does not seem to explicitly teach the conditions of the reactor.

However, BOURNAY teaches that alkyl esters of fatty acids and high purity glycerin can be produced by using a process comprising a set of transesterification

reactions between a vegetable or animal oil and an aliphatic monoalcohol employing a heterogeneous catalyst. BORUNARY teaches the conditions in lines 8-65 of column 4: upflow reactor; 30×10^5 to 80×10^5 Pa; 453 to 493 K; HSV of 1.2 h^{-1} to 0.1 h^{-1} . At least 90% by weight of the oil is converted. More than one reactors may be used. The mixture after reaction undergoes a depressurization phase. In lines 1-6 of column 5, the liquid is decanted in a decanter drum.

It would be obvious to one of ordinary skill in the art to apply the conditions that BORUNAY teaches with a reasonable expectation of success given that both BRADIN and BOURNAY are directed towards the production of esters from fatty acids.

The motivation to use the method that BOURNAY teaches can be found in lines 49-59 of column 2 in BOURNAY. BOURNAY teaches that high purity of glycerin can be formed.

Although BOURNAY does not seem to explicitly teach the ranges claimed in the present invention it would be obvious to one of ordinary skill in the art since it has been held that where the general conditions are known, optimization or workable ranges involve only routine experimentation to one of ordinary skill in the art. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention.

11. Claims 1-3 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over DELGADO PUCHE (USPGPUB 2003/0167681) in view of English translation of HILLION (FR 2794768).

Regarding claims 1 and 16, DELGADO PUCHE teaches a procedure to produce biodiesel fuels with improved properties at low temperature by **transesterify triglycerides with an alcohol, preferentially methanol or ethanol, in the presence of acid or base catalysts to produce mixtures of methyl or ethyl esters of fatty acids and crude glycerine; isolate the crude glycerin obtained as a secondary product; and then to make all or part of the glycerin react with aldehydes, ketones, to obtain the corresponding acetals.**

DELGADO PUCHE does not seem to explicitly teach a heterogeneous catalyst.

However, HILLION teaches in the first paragraph of the description a process for the manufacture of a fatty acid ester by the use of a **heterogeneous catalyst chosen from zinc oxide, a mixture of zinc oxide and alumina or a zinc aluminate consistent with the formula: $ZnAl_2O_4$, $xZnO$, $y AL_2O_3$ ($x, y= 0-2$), with a 1-18C mono-alcohol.**

It would be obvious to one of ordinary skill in the art to use the catalyst that HILLION as the transesterification catalyst in the process that BRADIN teaches.

The motivation to do so would be for the manufacture of a fatty acid ester to a high state of purity.

Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Regarding claims 17 and 18, DELGADO PUCHE teaches in paragraph 8 that the glycerine acetals mixed with methyl or ethyl esters of fatty acids in **biodiesel fuels**.

12. Claims 1-5, 6-8 and 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over DELGADO PUCHE (USPGPUB 2003/0167681) in view of English abstract of HILLION (FR 2855519).

Regarding claims 1 and 16, DELGADO PUCHE teaches a procedure to produce biodiesel fuels with improved properties at low temperature by **transesterify triglycerides with an alcohol, preferentially methanol or ethanol, in the presence of acid or base catalysts to produce mixtures of methyl or ethyl esters of fatty acids and crude glycerine; isolate the crude glycerin obtained as a secondary product; and then to make all or part of the glycerin react with aldehydes, ketones, to obtain the corresponding acetals.**

DELGADO PUCHE does not seem to explicitly teach a heterogeneous catalyst.

However, HILLION teaches in the abstract production of a fatty acid ester and high purity glycerine involves the reaction of a vegetable or mineral oil with a **1 - 18C aliphatic monoalcohol** in the presence of a mixture of antimony and aluminum oxides as catalyst. - The mixed oxide catalyst conforms to the formula: - **(SbOx)y(Al2O3)(1- y); - x = 1.2 - 2.6; and - y = 0.005 - 0.995..**

It would be obvious to one of ordinary skill in the art to use the catalyst that HILLION as the transesterification catalyst in the process that DELGADO PUCHE teaches.

The motivation to do so would be for the manufacture of a fatty acid ester to a high state of purity.

Therefore, the invention as a whole would have been *prima facie* obvious to one

of ordinary skill in the art at the time the invention was made.

Regarding claims 17 and 18, DELGADO PUCHE teaches in paragraph 8 that the glycerine acetals mixed with methyl or ethyl esters of fatty acids in **biodiesel fuels**.

Regarding claims 19 and 20, DELGADO PUCHE teaches in paragraph 16 that the triglycerides can correspond to any vegetal oil such as sunflower oil.

13. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over DELGADO PUCHE (USPGPUB 2003/0167681) in view of English translation of HILLION (FR 2794768) in view of NAKAGUCHI (U.S. 3,714,202).

The above discussion of DELGADO PUCHE is incorporated herein by reference.

DELGADO PUCHE does not seem to explicitly state using an acid catalyst in the acetalization step.

However, NAKAGUCHI teaches in lines 22-25 of column 8 that acetal synthesis may be performed with an acid catalyst.

It would be obvious to one of ordinary skill in the art to use an acid catalyst in the acetalization step in the process that DELGADO PUCHE teaches.

The motivation to do so would be to speed up the reaction by use of a catalyst.

Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Response to Arguments

14. Applicant's arguments filed 12/11/2009 have been fully considered but they are not persuasive. Applicants argue that the present invention teaches using crude glycerol without chemical treatment or purification. However, applicants present claims

teaches removing an alcohol from the glycerol by vacuum treatment which appears to be a purification step. Applicants argue that BRADIN teaches the use of a homogeneous catalyst and it would not be obvious to one of ordinary skill in the art to use the heterogeneous catalyst that HILLION teaches. While BRADIN does teach transesterified triglycerides with alcohols in the presence of acid, or base catalysts, BRADIN also teaches in lines 33-34 of column 3 that the fatty alkyl esters can be prepared by any well known means in the art. It would be obvious to one of ordinary skill in the art to use the heterogeneous catalyst that HILLION teaches in place of an acid or basic catalyst to achieve a high state of purity. Applicant further argues that HILLION teaches use of a catalyst that would require chemical treatment because of the nature of the ricin oil that is the source of triglycerides. However, BRADIN does not teach the washing steps of purifying the glycerol before etherification. Specifically BRADIN teaches in lines 1-15 of column 6 that the side reactions have been taken in account but the process can be run continually by adjusting reaction conditions to disfavor side reactions. Examiner is aware of the foreign priority claims. However, by amending claims 4 and 5 by removing zinc, the foreign references are no longer appear to be enabling for the presently claims.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. FR2855517 teaches preparation of a fatty acid ester and pure glycerine involves the reaction of a vegetable or animal oil with a 1 - 18C aliphatic monoalcohol in the presence of a heterogeneous catalyst comprising oxides of

aluminum and titanium. - The mixed oxide catalyst conforms to the formula $(\text{TiO}_x)_y(\text{Al}_2\text{O}_3)^{1-y}$ (I); - $x = 1.5 - 2.2$; and - $y = 0.005 - 1.2855519$ teaches production of a fatty acid ester and high purity glycerine involves the reaction of a vegetable or mineral oil with a $1 - 18\text{C}$ aliphatic monoalcohol in the presence of a mixture of antimony and aluminum oxides as catalyst. - The mixed oxide catalyst conforms to the formula: - $(\text{SbO}_x)_y(\text{Al}_2\text{O}_3)^{1-y}$; - $x = 1.2 - 2.6$; and - $y = 0.005 - 0.995$. - An INDEPENDENT CLAIM is also included for the products obtained by the above process

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MING CHEUNG PO whose telephone number is (571)270-5552. The examiner can normally be reached on 9:00 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571)272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ming Cheung Po
Patent Examiner

/Ellen M McAvoy/
Primary Examiner, Art Unit 1797